Official Journal of the Asian Pacific Society of Respirology
Respirology 25th
APSR

LETTER FROM ASIA-PACIFIC AND BEYOND

Letter from the United States: A New York experience with COVID-19

Key words: COVID-19, medical education, acute respiratory distress syndrome, telemedicine.

The sudden emergence of coronavirus disease 2019 (COVID-19) has had a profound impact on the practice of pulmonary and critical care medicine (PCCM) at our hospital, in New York City, the epicentre of the pandemic in the United States. From 6 March through 15 May 2020, we treated 1246 hospitalized COVID patients, with 268 needing mechanical ventilation, and during that same time, we took care of countless outpatients with acute COVID-19 illness and its sequelae.[1] The sudden surge of severely ill patients in a narrow time window imposed great stress on our resources, our patients, their families and our providers. In the process of caring for these patients, we learned much, and many of the lessons and adaptations that we made will change the practice of PCCM for years to come, both in and out of the hospital. In addition, we are developing new methods for providing education, training and supervision, which will also have a lasting impact on the nature and methods of postgraduate education in PCCM.

As we have become aware of the need for social distancing, and many patients are wary of returning to traditional offices and hospital settings, telemedicine has become a central part of our new world.[2] In the outpatient setting, we are seeing fewer patients face-to-face, and relying more on video visits. Telemedicine provides access to medical care, without long wait times, and can allow us to accurately evaluate some common problems such as lung nodules, mild asthma, mild chronic obstructive pulmonary disease (COPD), cough and dyspnoea. We have also seen a large number of patients who are recovering from COVID-19 and have symptoms of cough, post-infectious bronchospasm, dyspnoea, post-COVID-19 organizing pneumonia and a variety of non-specific respiratory complaints, and many of these can be managed remotely. It is clear that outpatient practice will need to accommodate the care of patients who have recovered from COVID-19. This will include not only those who did not require hospitalization, but also those surviving intensive care unit (ICU) care, who need to recover from 'post-ICU syndrome', with a focus on not only respiratory illness, but also psychological distress, occupational limitations and physical reconditioning. While telemedicine has facilitated some patient contact, especially with those reluctant to leave their homes, there are limitations to this technology. Most obviously, we have a limited ability to do a thorough physical examination of the lung, but we also miss the intangible 'sixth sense' that an experienced clinician can employ when sitting with a patient during an evaluation. During a video visit, we cannot do lung function testing or other physiological evaluations such as the 6-min walk test. Patient satisfaction with telemedicine is mixed, and in our experience, while patients find the visit to be acceptable, 60% have told us that they want their next visit to be done in person. We have worried that some patients without COVID-19 disease, but with other serious respiratory illnesses will avoid getting needed medical care, to their own detriment. Thus, going forward, we will need to find the right balance of in-person versus video visits, but after our recent experiences, it seems that telemedicine will be a permanent part of our practice. For the future, we anticipate that as many as half of all encounters will be by video, and that the frequency of being able to see complex patients may actually increase, using a mixture of in-person and video evaluations. For many patients, we may be able to alternate in-person with video visits, and optimize how closely we can monitor them .

The inpatient practice of PCCM will also be changed because of our experiences with COVID-19. Our entire concept of what defines an ICU and ICU team has changed. When we needed to develop 'pop-up ICUs' to handle a five- to six-fold higher number of critically ill patients than could be handled in our usual number of ICU beds, we improvised and developed ICU in areas that were not previously configured for this purpose. This included areas originally designated for lower levels of care, or even converting operating rooms into ICU.[3] We improvised with non-traditional ventilators, usually used for non-invasive ventilation, chronic ventilation or even by adapting anaesthesia machines to accommodate the fivefold greater number of ventilated patients. We developed multidisciplinary ICU teams using a mixture of PCCM physicians, nurses, anaesthesiologists, cardiologists, emergency medicine physicians, neurointensivists, surgical intensivists and even hospitalists. With proper supervision, organization and camaraderie, all members of the team brought their own unique expertise. We also developed specialized teams to help with very specific tasks. Thus, we had an intubation team comprised of anaesthesiologists and nurse anaesthetists; a vascular access team comprised of surgical proceduralists; and a proning team comprised of physical therapists. This type of specialization is not our usual practice, but was essential with the high volume of procedures being done in a short time period, and may be needed in the future for new surges of critical illness.

doi: 10.1111/resp.13893

Our experiences with COVID-19 taught us many new lessons about critical illness and specific aspects of disease management, which are likely to change our future practices. We had initially been reluctant to use high-flow oxygen and non-invasive ventilation, to forestall intubation, because of concern about transmitting viral infection. However, over time, we learned how to use these modalities in new ways, which sometimes helped us to avoid intubation in individual patients. We re-evaluated our understanding of hypoxaemic respiratory failure, and identified patients with traditional acute lung injury and non-compliant lungs, but also those with more compliant lungs with severe hypoxaemia and a possible pulmonary vascular disease component.[4] We have understood the multi-organ system dysfunction of COVID-19, with its coagulation, cardiac, cerebral and renal complications and this will heighten our awareness of similar complications in patients with other forms of critical illness.[5] Our understanding of acute lung injury mechanisms has evolved, with a renewed focus on 'cytokine storm' mechanisms of injury which has caused us to consider the timing of a variety of anti-inflammatory interventions including specific cytokine inhibitors (interleukin (IL)-1, IL-6 and others) and non-specific therapies such as corticosteroids.[6] In caring for COVID-19 patients, there was a great thought given to the optimal timing of tracheostomy from the perspective of patient benefit and staff infection risk. We generally waited 2–3 weeks before performing a tracheostomy, yet were often gratified to see that after the procedure, many patients were then successfully removed from heavy sedation and mechanical ventilation, lessons which we may be able to apply to other illnesses, going forward. Finally, our understanding of community-acquired pneumonia has changed, and it is likely that viral pneumonia will be an important focus of future studies, a direction in which we were already moving, as a result of prior pneumonia studies that showed an increasing importance of non-bacterial infection.[7]

In our centre, medical education is a vital part of our mission and in PCCM, we have 13 dedicated postgraduate fellows who spend 3 years doing a combined fellowship in PCCM (which includes 18 months of protected research time), as well as two others doing research fellowships. To manage the care needed for COVID-19 patients, all fellows gave up research and education activities to focus on providing clinical care. Although this was necessary, it may become an ongoing need when future ICU surges occur, and may detract from the research productivity of those with an investigative focus. All of the events surrounding the COVID-19 response will affect future recruitment of trainees in PCCM. While the experience will help to more closely integrate pulmonary with critical care, it remains unclear if our discipline will have more or less appeal to younger physicians. On one hand, COVID-19 demonstrated the reward and satisfaction of providing care to the most ill, and the excitement of putting basic physiological and scientific principles to use at the bedside, adding to the excitement of the specialty. On the other hand, the time and emotional strain of providing care to these patients was overwhelming, and the lifestyle demands on these physicians may be discouraging to future trainees. Methods of learning will change, with many lectures and conferences now being held online, a trend that will likely grow, going forward. Our recruitment process itself will change, with onsite tours and interviews being

Table 1 Changes in pulmonary and critical care medicine as a result of our experiences with COVID-19

Outpatient care
Enhanced use of telemedicine
Learning the benefits and limitations of telemedicine
Need for treating post-COVID-19 respiratory sequelae: bronchospasm, dyspnoea, organizing pneumonia
Need to provide comprehensive, multidisciplinary care for post-ICU syndrome in COVID-19 survivors
Inpatient care
Redefining the key components need for providing ICU care in a medical surge. Redefining the key elements of an ICU
Developing multidisciplinary ICU teams
Adapting non-traditional ventilation devices to acute respiratory failure
Assembling specialized teams to do specific tasks: intubation, invasive line placement, proning for acute lung injury
New understanding of ventilator strategies for acute lung injury
Better appreciation of the multi-organ involvement of patients with lung injury
Development of anti-inflammatory interventions for acute lung injury
Redefining the optimal timing of tracheostomy
Enhanced appreciation of the role of viral infection in community-acquired pneumonia
Medical education
Finding the balance between clinical service and research among subspecialty trainees
Making pulmonary and critical care an appealing specialty for future trainees
Incorporating video technology into education
Using new methods to interview fellow applicants, using online technology
Special attention to the emotional stress of our specialty, focusing on work/life balance of staff and finding new ways to prevent emotional burnout

COVID-19, coronavirus disease 2019; ICU, intensive care unit.

replaced by virtual exploration and online interviews. This new process may make it harder for institutions and applicants, to identify the best trainees and programmes, respectively. Finally, our trainees have been particularly prone to emotional 'burnout' during the care of multiple seriously ill patients.[8,9] Future educational programmes will need to continue to focus on work/life balance and support of emotional needs to prevent burnout, so that trainees can feel supported as they grow into their roles in their new specialty.

In New York, COVID-19 has led to a massive upheaval in many aspects of our specialty, and it is now our joint responsibility to learn from the experiences we have had, and transform our field for the good of patient care and the education of our future leaders (Table 1).

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